GLOSSARY

Absorption: *A physical mechanism in fibres that attenuates light by converting it into heat. In practice the temperature increase is very small. Absorption is mainly from impurities and from defects in the glass crystalline structure.*

Acceptance Angle: *Half the vertex angle of the cone within which light may be successfully coupled into a Multimode fibre. For graded index Multimode fibres, the acceptance angle varies depending on the position on the end face of the fibre's core.*

Attenuation: *The reduction in optical power as it passes through a fibre optic cabling system. In optical fibres, the power loss results from absorption and scattering and is generally expressed in decibels (dB) for a given length of fibre or per unit length (dB/km) at a specific wavelength.*

Backscattering: *The scattering of light in a direction opposite the original light source direction.*

Bandwidth: *It is the total range of frequency needed to send specific information at a given rate. For one channel telephone speech takes only a few KHz of bandwidth. Whereas for one channel television needs atleast several MHz. The greater the amount of information and the greater its necessary transfer rate the larger the bandwidth required.*

Bending Loss: *Loss caused because light does not maintain total internal reflection due to the curvature in the fibre bend. See macro bending loss and micro bending loss.*

Breaking Strength: *The amount of force needed to break a fibre.*

Brittle: *Easily broken without much bending.*

Buffer Fibre: *A protective acrylate/plastic coating applied over the fibre cladding.*

Bundle: *A group of fibres within a cable sharing a common binder group. For example, a group of fibres wrapped with a color coded tape in a cable or within a color coded plastic tube in a loose tube cable.*

Cable: *A cable modem is a hardware device that allows your computer to communicate with an Internet Service Provider (ISP) over a landline connection. To use the broadband internet it changes an analog signal to a digital signal. Transmission speeds are of about 1.5 Mbps. Cable modem service is accessed by the subscriber by simply turning on their computers. Speeds are same to DSL.*

Center Wavelength: *The wavelength of an optical source that might be considered to be most powerful and dominant within the spectrum of wavelengths emitted and is typically in the middle or center of all parts of the emitted spectrum.*

Chromatic Dispersion: *This is mainly a problem with LASER systems. Although LASER's emit a single mode they still emit more than one wavelength within that mode. Thus, the chroma or different*

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wavelength will travel at different speeds causing a spreading of the pulse at the distant receiver. With very high speed switching at high data rates this spread becomes critical to error free operation.

Cladding: *The glass layer that surrounds a fibre's core. It can be made up of plastic or silica. It is having the lower refractive index than that of the core.*

Cladding Diameter: *The diameter of the circle that circumscribes the cladding layer.*

Cleaving: *The controlled breaking of a fibre. Rough cleaving is used when making some connectors then the fibre is polished to create a smooth end surface. Precision cleaving breaks the fibre very precisely leaving a smooth end finish that is used in mechanical splices or fusion splices.*

Coating: *A protective material (usually plastic) applied to the fibre immediately after drawing to preserve its mechanical strength, and cushion it from external forces that can induce micro bending losses.*

Coherent/Focussed Light: *The light emission has the same amplitude and is in phase. LASERS emit coherent light over a certain distance after which it becomes incoherent.*

Conduit: *A tube or pipe that may be buried or installed within buildings for providing passage ways into which cables can be pulled.*

Connector: *It is used to join two fibres temporarily. Fibre can be disconnected or reconnected as per the requirement. Different types of connectors are used to join the fibres.*

Core of the fibre: *Core of the fibre is made up of glass through which light propagates. It is having the higher refractive index than that of the cladding.*

Core Diameter: *The diameter of the circle that circumscribes the core.*

Critical Angle: *The smallest angle at which a ray of light will be totally reflected within a fibre.*

Crosstalk: *The pickup of unwanted light from another fibre.*

Decibel (dB): *A unit used to express the ratio of two powers and given by 10 log(POUT/PIN). It is used to measure the attenuation of fibres, splices and connectors and the return loss from these and other components.*

Dispersion: *It is a term defined as spreading of light in fibre optics. In case of multimode fibre different rays of light travel inside the fibre. Hence, it arrives at different times at the output. This results in dispersion of light.*

dBm: *dBm is an abbreviation for the power ratio in decibel (dB) of the measured power referenced to one milliwatt (mW). Both dBm (decibel-milliwatts) and mW (milliwatts) are units of optical power. Power (dBm) = 10 log (power/1 mW).*

Detector: *A device that produces an electrical output signal when excited by an optical input signal.*

DSL (Digital Subscriber Line): *DSL is a medium of communication used to transfer digital signals over standard telephone lines. DSL is a wireline transmission technology that transmits data faster over traditional copper telephone lines already installed to home and business. The transmission speed ranges from hundred Kbps to millions of bits per second (Mbps).*

DTH: *'Direct to Home' The DTH technology enables a broadcasting of digital signal to your TV set through a receiver that is installed in the house.*

Frequency: *The number of times in a second an electric signal or electromagnetic wave, completes a cycle.*

Ferrule: *A tube which holds a Fibre for alignment. It is usually part of a connector. Typically a solid ceramic cylinder with a tiny hole through the middle of the cylindrical section where the fibre is fed through and fixed permanently with epoxy or adhesives.*

Fibre Optics: *Fibre optic technology converts electrical signals carrying data to light and sends the light through transparent glass fibres about the diameter of a human hair. Fibre transmits data at speeds far exceeding current DSL or cable modem speeds, typically by tens or even hundreds of Mbps. Spelling Fibre or Fiber is acceptable.*

Frequency: *The number of cycles per unit of time, denoted by Hertz (Hz). One Hz equals one cycle per second.*

FTTH: *Fibre to the home (FTTH), also called "fibre to the premises" (FTTP), is the installation and use of optical fibre from a central point directly to individual buildings such as residences, apartment buildings and businesses to provide unprecedented high-speed Internet access.*

Fuse: *To join two fibres together through heat melting.*

Fusion Splice: *Joining two fibres by applying localised heat sufficient to fuse or melt the ends of the two fibres together to form a continuous fibre.*

2G, 3G, 4G: *It is mobile phone technology known as 2,3,4G whereG denotes Generation. the 2G technology was used earlier in our country to transmit and receive voice over mobile phones. Later, the technology got updated to 3G. Hence, in 3G data speeds are high but not very fast. The Indian mobile operators like Airtel, Idea, Vodafone, etc., uses 2G for voice communication and 3G and 4G for data transmission. The Latest mobile operator Jio is a new one who do not have 2G or 3G but uses only 4G. Data transmission speed of 4G is higher than 3G.*

Glass: *It is transparent material. It is generally made of silica obtained from sand in abundance. It is breakable in nature.*

Gigabyte per second: *Gigabit per second has symbol Gbit/s or Gb/s, often abbreviated "Gbps". It is a unit of data transfer rate equal to: 1,000 megabits per second. 1,000,000 kilobits per second.*

Graded Index Fibre: *A type of fibre (Multimode) where the refractive index starts at a high value in the center of the core*

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and decreases smoothly with radius toward the cladding.

Hardware: *For Terminating the fibre and splicing the fibre hardware is required for protection and management patch panels, splice closures, etc.*

Hybrid Cable: *A cable containing both optical fibre and electrical conductors. Synonym for composite cable.*

Incident Angle: *The angle between an incident ray and a line perpendicular to the end face of a fibre.*

Incoherent Light: *A random form of light whereby the phase of the light is unpredictable. LED's emit incoherent light.*

Index Matching Gel: *A material, often a liquid, gel or epoxy whose refractive index is nearly equal to that of the fibre's core. Used to reduce the Fresnel reflections, refractive effects from a fibre end face. Also called elastomeric gel.*

Index Profile: *The refractive index of a fibre as a function of radius measurements from the central core to the outer cladding.*

Index of Refraction: *The ratio of light velocity in a vacuum to its velocity in a material medium. It is a function of wavelength and of the composition, temperature and pressure of the medium. Synonym for refractive index.*

Infrared (IR): *The band of the electromagnetic spectrum having wavelengths between 1 and 100 microns.*

Insertion Loss: *The optical power loss caused by inserting an optical component such as a fibre, connector, or splice into an optical transmission path. Synonym for loss and optical loss.*

Interconnect Cable: *Short distance cables intended for use within buildings primarily as patch cords, jumpers between equipment and generally less than 3 meters long.*

Ionising Radiation: *The form of electromagnetic radiation that can turn an atom into an ion by knocking one or more of its electrons loose. Examples are X rays, gamma rays and cosmic rays.*

Jacket: *A plastic extrusion over a fibre or cable.Jacket also called as buffer is used to protect the fibre from physical damages, shocks and vibrations.*

Joint: *The general term used to include both connectors and splices.*

Kbps: *Kbps full form is kilobits per second (thousands of bits per second). It is a measure of the amount of data that can flow in a given time on a data transmission medium.*

LAN: *A LAN is a group of personal computers that are linked by cable like in an office building. LAN is abbreviated as 'local area network'.*

Laminate: *A sheet of two dissimilar materials joined together.*

LASER: *Light Amplification by Stimulated Emission of Radiation. An optical source that emits coherent light with a narrow beam and narrow spectral width.*

Lateral offset: *Transverse misalignment of a source to fibre, fibre to fibre, or fibre to detector. Lateral offset causes an extrinsic loss that depends on the joining hardware and method.*

Launch angle: *The angle between an incoming light ray into a fibre and the fibre's axis.*

Launching fibre: *A fibre whose light output excites another fibre in a particular way.*

LED (Light Emitting Diode): *A semiconductor optical source that emits incoherent light. LED's emit light over wider angles and wider spectral widths than lasers.*

Light: *Traditionally, the region of the electromagnetic spectrum perceived by the human eyes. However, the term is used more generally in fibre optics to include wavelengths from about 0.3 to 30 um.*

Local detection: *A method for testing splices in which light is detected from the fibre immediately after the splice.*

Local injection: *A method for testing splices in which light is injected into the fibre immediately before the splice.*

Long wavelength: *Light whose wavelength is greater than about 1 um.*

Loose construction: *A type of cable construction in which the fibres are permitted to float freely to relieve stresses and minimise bending induced losses.*

Loose tube: *A loose cable construction in which a loose plastic tube is extruded around one to 12 fibres. Several tubes may then be stranded together to make a cable.*

Macro bend: *A large fibre bend that can be seen with the unaided eye.*

Macro bending loss: *The loss attributed to large bends in a fibre.*

Manhole: *An underground vault made from concrete or fibreglass, that is large enough for a person to enter and splice cables.*

Material dispersion: *One of the two components that causes chromatic dispersion. Material dispersion arises because the index of refraction of glass depends on the wavelength of light.*

Mechanical Protection (MP): *An outer cable covering consisting of a corrugated steel tape plus an outer polyethylene jacket.*

Mechanical splice: *Any splicing method except fusion.*

Mechanical stripping: *Removing the coating from a fibre using a tool similar to those use for removing insulation from wires.*

Micro bend: *A small fibre bend that cannot be seen with the unaided eye. The bends are only a few micrometers high and have periods of a few millimeters. They can occur due to coating, cabling, installation and temperature, etc.*

Micro bending loss: *The loss attributed to microscopic bends in a fibre.*

Micro cracks: *Submicroscopic flaws in the surface of glass fibres.*

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Modal bandwidth: *A bandwidth limiting mechanism in Multimode fibres (and also in "Singlemode" fibres when operated at wavelengths below cutoff). Modal bandwidth arises because of the different arrival times of the various modes. Synonym for inter modal distortion.*

Modal noise: *Fluctuation in optical power because of the interaction of power traveling in more than one mode.*

Mode: *A single "electromagnetic field pattern or the radiation" (think of a ray of light) that travels in Fibre. A discrete electromagnetic field pattern within a fibre. Only one mode propagates in a Singlemode fibre, whereas several hundred modes propagate in a Multimode fibre.*

Modem: *Modems is used for both sending and receiving of the digital information between personal computers. The access to the Internet more commonly takes place using high-speed broadband modems*

Monochromatic: *Consisting of one color or wavelength. Although light in practice is never perfectly monochromatic, it can display a narrow range of wavelengths.*

Monomode fibre: *See Singlemode fibre.*

Mbps: *Mbps is used to define the Internet connection speeds. It basically measure capacity and speed of data transfer.*

Multi fibre splice: *Simultaneously splicing more than two fibres.*

Multimode fibre: *A fibre whose core diameter is large compared with the wavelength of light and therefore propagates more than one mode.*

Multiplexing: *Multiplexing means sending multiple signal streams of information on a carrier at the same time as a single signal.*

Network: *A network is a collection of computers, servers, mainframes, network devices, peripherals, or other devices connected to one another to allow the sharing of data. An excellent example of a network is the Internet, which connects millions of people all over the world.*

Noise: *Any unwanted signal.*

Non ionising radiation: *Electromagnetic radiation that does not turn an atom into an ion. Examples are visible light and radio waves.*

Nonmetallic cable: *See dielectric sheath or cable.*

Numerical Aperture (NA): *An angle just outside the end face of a fibre that describes the largest angle that a light ray can have to the fibre axis and still be captured and propagated within the fibre.*

Open: *A broken fibre.*

Optical Power: *It is measured in "dBm", or decibels referenced to one mili-watt of power. While loss is a relative reading, optical power is an absolute measurement, referenced to standards. You measure absolute power to test transmitters or receivers and relative power to test loss.*

Optical Loss: *It is defined as the amount of optical power lost as* *light is transmitted through fibre, splices, couplers, etc. This optical is expressed in "dB" which is dimensionless.*

Optical cable assembly: *A cable that is terminated with connectors. Usually the cable has been terminated by a manufacturer and is ready for installation.*

Optical Time Domain Reflectometer (OTDR): *An instrument for characterising a fibre. An optical pulse is sent down a fibre and the resulting backscattered light and reflected light back to the input is displayed as a function of distance on a screen. The instrument is useful for measuring fibre loss, splice loss and determining the location of faults or breaks.*

Optoelectronic: *A device that converts optical signals to electrical signals or vice versa.*

Organiser Splice Tray: *A mechanical assembly consisting of a frame, one or more splice trays and mounting hardware.*

Outside plant: *The portion of a cable network that resides outside of buildings. Outside plant can consist of cable, conduit, utility poles, and enclosures.*

Passive splicing: *Aligning the two ends of a fibre without monitoring its splice loss.*

Photon: *A discrete quantity of light energy.*

Pigtail: *A short length of fibre permanently attached to a component and use to couple light between it and another fibre.*

Plug connector: *The cylindrical or conical ferrule portion of a connector with the fibre fastened inside.*

Polarisation: *The property of light relating to the direction of the vibrations. Light from the sun, incandescent lamps and many other sources vibrate in many directions perpendicular to the direction the light ray is traveling and is said to be randomly polarised. For lasers, the vibrations (all in a plane perpendicular to the light ray) are in a definite form that may be a straight line, circle, or ellipse.*

Polarisation maintaining fibre: *A Singlemode fibre that transmits light without changing its state of polarisation. Synonym for polarisation retaining fibre.*

Pole utility: *A tall slender column of wood, fibreglass, concrete, or steel used to support cables.*

Polishing: *Preparing a fibre end by moving the end over an abrasive material (lapping film).*

Preform: *A glass structure that's a magnified version of the fibre to be drawn from it.*

Primary coating: *The first protective coating applied to the surface of a fibre in a dual coat structure.*

Public Switched Telephone Network (PSTN): *The public switched telephone network (PSTN) uses copper wires to carry analog voice data. The public switched telephone network was earlier known as the public telephone network.*

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Pulse spreading: *An increase in the width of an optical pulse as it travels along a fibre.*

Quality assurance test: *A test to verify that a product meets advertised performance specifications.*

Radiation: *Energy and its propagation through matter or space. Radiation may either be "electromagnetic," which is usually considered to travel in the form of waves, or "particles" which is sub atomic particles moving at high speeds.*

Ray: *A geometrical representation of a light path through an optical medium that indicates the direction of energy flow.*

Rayleigh scattering: *Scattering of light caused by index of refraction variations in the submicroscopic structure of the glass.*

Receiver: *An optical and electronic package that takes optical input signals and converts them to electrical output signals.*

Reel, cable: *A large wooden or steel spool on which cable is wound for shipping and storage.*

Reflectance: *The ratio of reflected power to incident power. Synonym for "return loss."*

Reflection: *The abrupt change in direction of light as it travels from one material to a dissimilar material. Some of the reflected power in a fibre gets transmitted back to the source.*

Refraction: *The bending of light as it passes through two dissimilar materials or in a medium whose refractive index varies.*

Refractive index: *See index of refraction.*

Regenerator: *A receiver and transmitter combination used to reconstruct signals for digital transmission. The receiver converts incoming optical pulses to electrical pulses, decides whether the pulses are "1's" or "0's" generates "new" electrical pulses, and then converts them to "new" optical pulses for transmission on the fibre.*

Repeater: *An optoelectronic device that amplifies or boosts a signal. This is an analog technique, no regeneration takes place.*

Restoration, cable: *Locating, repairing and returning service to a damaged cable during an emergency.*

Return loss: *The reflectance measured at a point of reflection and then calculating the loss of that reflectance back to the source. This is important as too much reflectance may cause distortions in the transmitting device.*

Ribbon: *An assemblage of up to 12 fibres laid parallel to one another side by side and fastened together. Several ribbons can then be stacked on top of one another to make a cable.*

Satellite: *Satellite broadband is a type of wireless broadband. It is useful for proving the service to the remote or sparsely populated areas.*

Scattering: *Scattering is the phenomenon by which a beam of light is redirected in many different directions when it interacts with a particle of matter. The intensity of the scattered light depends on the size of the particles and the wavelength of the light.*

Secondary coating: *The protective coating applied over the fibre's primary coating in a dual coat structure.*

Sheath: *The protective outer covering of a cable core. It may consist of plastics, metals and nonmetallic strength members.*

Shield cable: *The metallic components in a cable sheath that drain off the current induced by lightning discharges.*

Short patch: *An emergency cable restoration method in which a short length of cable is used to patch around the damaged region.*

Short wavelength: *Used to refer to light having wavelengths generally less than 1 µm.*

Signal: *It is an electromagnetic representation of data.*

Signalling: *It is the act of propagating a signal over a suitable medium.*

Silica: *The short name for the chemical compound silicon dioxide (SiO2). Silica exists in nature both in free form as in quartz and in combined form as in the silicates.*

Silicate: *A chemical compound of silicon, oxygen and metals.*

Single end pull: *A method for pulling cable into conduit or duct liner from one direction. The cable reel is positioned at a splicing manhole and a truck with a capstan which is located at the pull manhole.*

Singlemode fibre: *A fibre having a small core diameter and in which only one mode (the fundamental mode which may consist of two polarisations) will propagate at the wavelengths of interest.*

Slotted core: *A loose cable construction in which fibres are loosely placed into slots (grooves) molded around the outside surface of a plastic rod. Synonym for open channel and fluted.*

Source: *A device (usually LASER or LED) that emits light energy.*

Spectrum: *The range of electromagnetic radio frequencies used in the transmission of voice, data, etc.*

Spectral width: *A measure of the wavelength content of optical power.*

Splice: *A permanent joint between two Fibres is called splicing. A connection of one or several fibres that in most instances is considered permanent. Splicing can be classified as fusion or mechanical splicing.*

Splice case: *A metal or plastic housing used to enclose and protect fibre splices. Synonym for splice closure.*

Splicing cut ends: *An emergency cable restoration method in which the cut ends are put back together.*

Static fatigue: *The decrease in fibre strength with time when under stress and exposed to humidity, high temperature, alkalinity or ammonia.*

Step index fibre: *A fibre having a uniform refractive index in its core and a sharp decrease in refractive index at the core cladding interface.*

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Strain: *The length by which a wire or fibre deforms divided by its original length.*

Stranding: *The manufacturing process by which fibres are wrapped about some other cable member. Stranding imparts extra length to the fibres.*

Strength member: *Steel aramid yarns, fibreglass epoxy, rods or other material used to increase the tensile strength of a cable.*

Stress: *The force per unit of cross sectional area.*

Stripping: *Removing the coating from a fibre.*

Support strand: *A stranded metallic cable attached to utility poles and used to support aerial cables. The cables are lashed or clipped to the support strand.*

Switch: *A mechanical or electronic device that opens or closes circuits. It also completes or breaks an electrical path or selects paths or circuits.*

Talk set optical: *An instrument for talking over fibres usually when installing and testing the cable.*

Target rod: *A solid cylinder usually made from alumina onto which submicroscopic glass particles are deposited in the OVD process.*

Tensile strength: *The pulling force necessary to break a material.*

Tight construction: *A type of cable construction in which the fibres are tightly coupled to other cable components and move with them.*

Total bandwidth: *The combined modal and chromatic bandwidth.*

Total internal reflection: *Confinement of light within a structure by having the light strike the interface between two optically different materials at an angle of incidence greater than the critical angle.*

Transmitter: *An optical and electronic package that takes electrical input signals and converts them to optical output signals.*

Tray splicing: *Flat rectangular compartments used to secure splices and store excess fibre.*

TRAI: *Telecom Regulatory Authority of India (TRAI) is an independent regulatory body established by the Telecom Regulatory Authority of India Act 1997 to oversee the telecommunications industry in India.*

Telephony: *Word used to describe the science of transmitting voice over a telecommunications network.*

Ultraviolet: *The region of the electromagnetic spectrum containing wavelengths between 0.04 and 0.4 tan.*

Under fill: *A condition for launching light into a fibre in which not all the modes that the fibre can support are excited.*

Underground: *Cable installed in buried conduit. Does not include cables buried directly in the ground.*

Universal closure: *A splice closure suitable for use in aerial, underground or buried plant.*

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Waterproof cable: *Cable containing a filling compound in all available spaces in the core to resist the entrance of water.*

Waveguide: *A conducting or dielectric structure able to support and propagate one or more modes.*

Wavelength: *It is a term used to measure light in terms of nm or microns (m). Fibre specifications like attenuation, dispersion are expressed in terms of wavelength. Wavelength is inversely proportional to the frequency of light. It means if frequency increases wavelength decreases and vice-versa.*

Wavelength Division Multiplexing (WDM): *A method to simultaneously transmit two or more optical signals on a fibre by using different wavelengths.*

Web browsing: *A web browser is a software application for accessing information on the World Wide Web. Every individual web page, image, and video is identified by a unique URL (uniform resource locator).*

Wireless: *Wireless broadband the Internet is connected to home or business by radio link. This link is between the customer's location and the service provider's facility. Speeds are generally same to DSL (digital subscriber line) and cable modem.*

Wireless local loop: *Wireless local loop is used for wireless communication links. It deliver plain old telephone services or broadband services to customers. This is best used in areas where cable infrastructure is either expensive or speed is not fast.*

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